Farhat Binte Azam

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Education

Ph.D. in Computer Science and Engineering (CSE)   Jan'21 – Dec'25
University of South Florida (USF)

M.S. in Computer Science   Jan'21 – Dec'23
University of South Florida (USF)

B.Sc. in Electrical and Electronics Engineering (EEE)   Feb'15 – Mar'21
Bangladesh University of Engineering and Technology (BUET)

Software Development Skills

Programming & Cloud Computing: Python, C, C++, SQL, Git, Amazon Web Services (AWS), Google Cloud
Deep Learning Tools: PyTorch, TensorFlow, Keras, OpenCV, NumPy, Pandas, Scikit-learn, Matplotlib
Hardware & Simulation: CUDA, Linux, Arduino, Raspberry Pi

Work Experience

Postdoctoral Scholar (AI Research & Engineering Lead)   Jan'26 – Present
Bellini College of Artificial Intelligence, Cybersecurity and Computing, University of South Florida (USF)
Supervisor: Dr. Sriram Chellappan

- Lead end-to-end development of an AI-driven mosquito surveillance platform spanning embedded sensing, cloud-native data engineering, and production-grade model deployment to enable scalable, real-time vector monitoring.
- Architect and operationalize a Google Cloud–based data pipeline (trap → storage → PostgreSQL database → analytics), and drive model development for dense-object mosquito localization to improve detection robustness under cluttered field conditions.
- Own the dataset and labeling ecosystem by building an annotation and review dashboard for certified entomologists, establishing high-quality ground truth and accelerating iterative training of localization and classification models for actionable mosquito risk intelligence.

Graduate Research Assistant   Jan'21 – Dec'25
Social Computing and Research (SCoRe) Lab, Computer Science, USF   *Supervisor: Dr. Sriram Chellappan*

- Designed and developed an AI-powered system (MosquitoAI) using computer vision for mosquito anatomy classification and segmentation.
- Led multidisciplinary deployment of AI models on embedded hardware (Mosquito-Trap) to advance real-time surveillance capabilities.
- Collaborated to deploy models into accessible AI dashboards to support citizen scientists in mosquito monitoring.

Research Assistant   Feb'20 – Dec'20
mHealth Laboratory, Biomedical Engineering, BUET   *Supervisor: Dr. Taufiq Hasan*

- Led creation of a comprehensive phonocardiogram (PCG) dataset by coordinating data collection with clinicians in hospital environments.
- Developed a deep learning framework with a novel feature-fusion approach to address noise and channel distortion in heart-sound signals captured via digital stethoscopes.
- Co-authored a research publication detailing the dataset and model, contributing key signal preprocessing and noise-handling methods.

Research Projects

MosquitoAI: AI-Driven System for Mosquito Monitoring

- Built a comprehensive mosquito (adult and larvae) database through collaboration with Mosquito Alert, iNaturalist, and GLOBE Observer's Mosquito Habitat Mapper.
- Developed end-to-end deep learning pipelines (data preprocessing, training, benchmarking) to categorize diverse facets of mosquito anatomy.
- Implemented explainable AI (XAI) methods for feature attribution and model interpretability analysis.

Edge-to-Cloud Smart Mosquito Trap for Automated Vector Monitoring

- Designed a cloud-based AI image-processing pipeline that syncs multi-focus captures from edge devices (Raspberry Pi).
- Deployed Faster R-CNN for mosquito detection and classification; stored results in a NoSQL database with metadata logged in PostgreSQL for efficient querying.
- Enabled automated disease-vector alerts to public-health officials through integrated cloud and database workflows.

Ceps-NET: AI-Based Cardiac Auscultation Systems in Noisy Environments

- Analyzed additive noise and convolutional distortion impacts on short-term mel-filterbank energy features and CNN layers.
- Proposed a combined linear and logarithmic feature representation with ResNet-style modeling to reduce background-noise and sensor-variability effects for PCG classification.

Vein-NET: Robust Human Authentication using Dynamic ROI Extraction from Dorsal/Palm Hand Vein Images

- Developed a CNN-based ROI extractor to crop vein regions from full hand images and applied computer vision algorithms to derive discriminative features.
- Trained on challenging datasets and applied domain adaptation via Domain-Adversarial Neural Networks (DANN) for domain-invariant recognition.

Publications

- Author: "Classifying stages in the gonotrophic cycle of mosquitoes from images using computer vision techniques." *Scientific Reports* (Nature Portfolio), 2023.
- Author: "Deep Learning-Based Classification of *Anopheles stephensi* Adult Mosquitoes with Enhanced Solutions for Data Imbalance." *IEEE Engineering in Medicine and Biology Society*, 2025.
- Author: "Mosquito Classification and Explainability from Image Data via Deep Learning Techniques." Ph.D. Thesis, 2025.
- Co-author: "Artificial intelligence and community science as a solution for enhanced global surveillance of invasive malaria mosquito *Anopheles stephensi*: Madagascar case study." *Insects*, 16(11), 1098.
- Co-author: "BUET Multi-disease Heart Sound Dataset: A Comprehensive Auscultation Dataset for Developing Computer-Aided Diagnostic Systems." *Computer Methods and Programs in Biomedicine Update*, 100237.
- Co-author: "Integrating global citizen science platforms to enable next-generation surveillance of invasive and vector mosquitoes." *Insects* 13(8): 675, 2022 (Best Paper Award).
- Author: "Cardiac anomaly detection considering an additive noise and convolutional distortion model of heart sound recordings." *Artificial Intelligence in Medicine* 133, 2022.
- Co-author: "Evaluation of bactericidal effects of silver hydrosol nanotherapeutics against *Enterococcus faecium* 1449 drug resistant biofilms." *Frontiers in Cellular and Infection Microbiology* 12, 2023.
- Co-author: "GLOBE Observer: A Case Study in Advancing Earth System Knowledge with AI-Powered Citizen

Science." *Citizen Science: Theory and Practice*, 2024.

- Co-author: "Citizen Science-Enabled Tools for the Global Surveillance and Control of Mosquitoes." *AGU Fall Meeting Abstracts*, 2022.

US Patents

- Author: "Methods and techniques to classify stages in the gonotrophic cycle of mosquitoes from images using computer vision techniques." U.S. Patent Application No. 18/776,899.

Non-Academic Courses

- Generative AI with Large Language Models (deeplearning.ai and Amazon Web Services)
- Deep Learning Specialization (deeplearning.ai; Instructor: Andrew Ng) — Neural Networks and Deep Learning (96.5%), Improving DNN (95%), Structuring ML Projects (86.7%), CNN (95.6%), Sequence Models (98.5%)
- Machine Learning (Stanford University) — 95.7%